Deutscher Bundestag **Drucksache 19/12277**

19. Wahlperiode 12.08.2019

Antwort

der Bundesregierung

auf die Kleine Anfrage der Abgeordneten Berengar Elsner von Gronow, Dietmar Friedhoff, Martin Hess, weiterer Abgeordneter und der Fraktion der AfD – Drucksache 19/11424 –

Mögliche (Langzeit-)Schäden von Soldaten der Bundeswehr im Zusammenhang mit dem Einsatz von Geschossen mit DU-Kernen in Kriegs- und Krisengebieten

Vorbemerkung der Fragesteller

In den Kriegs- und Krisenregionen der vergangenen Jahre und Jahrzehnte wurden durch alliierte Streitkräfte Geschosse mit DU-Kernen (DU – Depleted Uranium) zum Einsatz gebracht. Dies betrifft unter anderem die heutigen Staaten Bosnien-Herzegowina, den Irak und das Kosovo. In diesen drei Staaten waren oder sind bis heute Soldaten der Bundeswehr im Einsatz.

Die UNEP (United Nations Enviroment Programme) hat im Jahr 2001 einen Bericht zu Depleted Uranium im Kosovo veröffentlicht (https://wedocs.unep.org/handle/20.500.11822/8647) und weist auf mögliche Langzeitwirkungen hin: „Obwohl die Strahlendosen sehr niedrig sind, könnte die resultierende Urankonzentration die WHO-Gesundheitsstandards für Trinkwasser überschreiten“ (www.un.org/earthwatch/humanset/kosovo.html).

Die deutsche Sektion der Internationalen Ärzte für die Verhütung des Atomkrieges/Ärzte in sozialer Verantwortung e. V. (IPPNW) weist auf ihrer Homepage auf Folgendes hin: „UNEP fordert einen vorbeugenden Ansatz und empfiehlt eine Reihe von Maßnahmen zur Minimierung der Risiken für die Umwelt und die Bevölkerung des Kosovo und die weitere Balkanregion, sowohl jetzt als auch in Zukunft“ (www.ippnw.de/commonFiles/pdfs/Frieden/UNEP_dokumentation.pdf).

Vorbemerkung der Bundesregierung

Der vermutete Zusammenhang zwischen dem Einsatz von DU-Munition und dem Auftreten von Krebserkrankungen führte bereits 1999 zu einer öffentlichen Diskussion.

Die Antwort wurde namens der Bundesregierung mit Schreiben des Bundesministeriums der Verteidigung vom 8. August 2019 übermittelt.

Die Drucksache enthält zusätzlich – in kleinerer Schrifttype – den Fragetext.

Neben Maßnahmen zur Verhaltensprävention und Untersuchungen zum Vorkommen ordnete die Bundeswehr 2001 vorsorglich eine gesundheitliche Überwachung des deutschen Einsatzkontingentes KFOR durch die Gesellschaft für Strahlenforschung an. Die Ergebnisse der Untersuchung zeigten, dass die Einsatzorte so gut wie keine radiologischen Gesundheitsrisiken bargen und toxikologische Risiken nur unter außergewöhnlichen, bis heute zu keinem Zeitpunkt eingetretenen Umstände bestanden hätten.

Der Bundesregierung sind keine deutschen Soldatinnen und Soldaten bekannt, die in Folge einer Uranexposition im Rahmen eines Auslandseinsatzes erkrankt wären.

1. Welche Erkenntnisse hat die Bundesregierung hinsichtlich der Beschädigung von deutschen Soldaten, die im Rahmen eines Auslandseinsatzes mit DU-Geschossen mittelbar und/oder unmittelbar in Berührung gekommen sind?

Der Bundesregierung sind keine deutschen Soldatinnen und Soldaten bekannt, die im Rahmen eines Auslandseinsatzes mit DU-Munition im Zusammenhang mit einer möglichen Exposition gesundheitliche Schäden davongetragen haben.

a) Wie viele Anträge auf Wehrdienstbeschädigung wurden in Zusammenhang mit dieser Thematik in den vergangenen 25 Jahren gestellt?

Im Zeitraum von 1999 bis 2008 wurden im Bereich der Bundeswehr überwiegend im Zusammenhang mit besonderen Auslandseinsätzen in Bosnien-Herzegowina und im Kosovo insgesamt 229 Wehrdienstbeschädigungsanträge (WDB-Anträge) wegen geltend gemachter Kontamination mit abgereichertem Uran aus DU-Munition gestellt.

Mit dem Ziel einer vorsorglichen Erfassung wurden die Anträge im Sinne etwaiger späterer Ansprüche ohne das Vorliegen einer Erkrankung gestellt.

Aufgrund der geringen Anzahl der entsprechend gestellten Anträge ab dem Jahr 2009 (unter einem Antrag pro Jahr) wurde die gesonderte statistische Erfassung eingestellt.

b) Wie viele Anträge auf Wehrdienstbeschädigung wurden positiv beschieden?

Bislang ist in der Bundeswehr keine WDB-Anerkennung auf Grund von DU-Munition erfolgt.

2. Wie hoch schätzt die Bundesregierung die Gefahr für deutsche Soldaten im Kosovo ein, in Berührung mit Depleted Uranium zu kommen?

   Wann und inwiefern war diese Gefahrenquelle Thema bei Beratungen im Bundesministerium der Verteidigung?

Im Ergebnis der ABC-Bedrohungs- und Risikoanalyse wird das radiologische Gefahrenpotential (auch DU-Munition) für das Gebiet des Kosovo weiterhin als niedrig bewertet.

Die fortgeschriebenen Risikoevaluierungen vor, während und nach der Durchführung von Einsätzen, u. a. aus den Bereichen der Medical Intelligence und der ABC-Abwehr sind Bestandteil der kontinuierlichen ministeriellen Beratung und Grundlage situationsgerechter Entscheidungsfindung.

3. Welche Maßnahmen werden im Vorfeld und während eines Einsatzes ergriffen, um sicherzustellen, dass das Risiko deutscher Soldaten, mit DU-Geschossen und/oder deren Rückständen in Berührung zu kommen, ausgeschlossen oder auf ein Minimum reduziert wird?

In Einsatzgebieten, in denen sich deutsche Soldatinnen und Soldaten befinden, werden entsprechend der bekannten Kampfmittelbelastung qualifiziertes Kampfmittelbeseitigungspersonal und/oder ABC-Abwehrkräfte ausgeplant. Diese Kräfte sind befähigt, militärisch zu nutzende Flächen, aufgefundene Ziele, die mit DU-gehärteter Rohrwaffenmunition bekämpft worden sein könnten sowie aufgefundene Kampfmittel(-reste) auf DU hin zu untersuchen. Hiervon ausgehend wird das Risiko für Betroffene konkret eingeschätzt und bewertet.

Im Rahmen der einsatzvorbereitenden Ausbildung werden Soldatinnen und Soldaten über das mögliche Risiko informiert und über etwaig geeignete Schutzmaßnahmen unterrichtet. Diese Handlungsanweisungen berücksichtigen die gesamte Bandbreite von der Anweisung, Munition oder Munitionsteile nicht unnötig zu berühren, bis zur Weitermeldung an den örtlichen Führer und die Durchführung persönlicher Schutzmaßnahmen bei unvermeidbarer Annäherung an eine potenziell kontaminierte Stelle.

4. Welche Informationen werden vor und während eines Einsatzes an deutsche Soldaten ausgegeben, so dass diese für den Umgang mit DU-Geschossen und deren Rückständen in Einsatzgebieten aufgeklärt und sensibilisiert werden?

Die Bundeswehr informiert und vermittelt den Soldatinnen und Soldaten in der einsatzvorbereitenden Ausbildung ein angemessenes Verhalten in möglicherweise mit DU-Munition belasteten Gebieten.

Ergänzend wurden aktuelle einsatzspezifische Informationen und Verhaltensregeln durch Fachexperten im Rahmen von Vorträgen und Unterrichten aufgezeigt. Zugleich wird jeder Soldatin und jedem Soldaten eine Taschenkarte zu dieser Thematik ausgehändigt.

Im Einsatz selbst erfolgt für jede Soldatin und jeden Soldaten die Ein- und Unterweisung in die Gefährdungslage vor Ort. Im Anschluss an den Einsatz besteht für jede Soldatin und jeden Soldaten die Möglichkeit, eine Beratung durch die Betriebsärztin oder den Betriebsarzt in Anspruch zu nehmen.

5. Wird der Anteil von Uran regelmäßig bei dem geförderten Trinkwasser in den Einsatzgebieten gemessen?

   a) Wenn nein, warum nicht?

   b) Wenn ja, mit welcher Regelmäßigkeit

   (bitte nach Einsatzgebieten und allen aktuellen und bisher abgeschlossenen mandatierten Einsätzen der Bundeswehr aufgliedern)?

Die Fragen 5 bis 5b werden zusammen beantwortet.

Aus Gründen des vorbeugenden Gesundheitsschutzes der Soldatinnen und Soldaten wird in Auslandseinsätzen der Bundeswehr eine Überwachung des geförderten Trinkwassers auf Uran konsequent durchgeführt. Hiermit wird eine ggf. bestehende Belastung des Trinkwassers mit Uran verlässlich erkannt, um ein mögliches Risiko durch Rückstände sogenannter DU-Munition ausschließen zu können.

Die Bundeswehr führt pro Jahr eine Beprobung und Untersuchung der Qualität des geförderten Trinkwassers je Kontingent der einsatzgleichen Verpflichtungen, und in allen Auslandseinsätzen dreimal pro Jahr (einmal durch jedes Einsatzkontingent) durch. Für Trinkwasser lagen die Messwerte bisher stets unterhalb des Grenzwertes der Trinkwasserverordnung. Dies gilt entsprechend auch bei Anwendung des toxikologisch zu beachtenden Richtwerts der Weltgesundheitsorganisation.

Hiervon ausgehend ist ein Eintrag von Uran aus DU-Munition in das Trinkwasser in den Einsatzgebieten auszuschließen.

6. Auf welche Gefahrenstoffe wird das Trinkwasser, welches in Einsatzgebieten für die Bundeswehr gefördert wird, untersucht (bitte nach Einsatzgebieten und allen aktuellen und bisher abgeschlossenen mandatierten Einsätzen der Bundeswehr sowie Benennung aller Messwerte und der jeweiligen Grenzwerte je Kalenderjahr aufgliedern)?

   Welche Maßnahmen wurden bei Überschreitungen von Grenzwerten ergriffen?

Unter Berücksichtigung des Konzepts der Wassernutzung in den jeweiligen DEU Einsatzkontingenten wird die Einhaltung der Trinkwasserqualität durch die Leitenden Hygieniker im Einsatz nach den Vorgaben der Trinkwasserverordnung bzw. der für den jeweiligen Einsatz festgelegten Anforderungen der NATO für die Trinkwasserqualität überwacht.

Die entsprechend zu beachtenden Parameter der Trinkwasserverordnung bzw. dem Standardization Agreement (STANAG) 2136 als Grundlage für die kontingentbezogen vorzunehmende Bewertung im Rahmen der Trinkwasserüberwachung sind als Anlage* beigefügt. Entlang dieser Vorgaben wird der Untersuchungsumfang für gefördertes Trinkwasser im Auslandseinsatz durch die Leitenden Hygieniker im Einsatz in ihrer Eigenschaft als Sachverständige bzw. als Amtsärzte der Bundeswehr festgelegt.

Überschreitungen von Grenzwerten bei Gefahrenstoffen wurden bisher im Rahmen von Trinkwasseruntersuchungen nicht beobachtet.

Unabhängig von der Herkunft des Rohwassers wird stets vor der Einspeisung in das Leitungsnetz der Einsatzliegenschaft eine Aufbereitung durchgeführt. Die Qualität des Wassers wird dabei nach Trinkwasserverordnung bzw. bei multinational genutzten Einsatzliegenschaften gemäß STANAG 2136 vor Aufbereitung, nach Aufbereitung und an ausgewählten Probeentnahmestellen des Leitungsnetzes überwacht.

7. Welche Abstimmungen mit alliierten Streitkräften gibt es, um die Gebiete, in denen DU-Geschosse zum Einsatz gekommen sind, zu detektieren und entsprechende Schutzmaßnahmen für deutsche Soldaten abzuleiten?

Der Bundesregierung wird ein Einsatz von DU-Munition durch andere Nationen nicht angezeigt. Diesbezüglich bestehen weder eine Informationspflicht noch formale Verfahren zur Abstimmung mit alliierten Streitkräften, so dass die erforderlichen Schutzmaßnahmen für deutsche Soldatinnen und Soldaten aus den vorstehend benannten Analysen und Untersuchungen der Medical Intelligence und der ABC-Abwehr abgeleitet werden.

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* Von einer Drucklegung der Anlage wird abgesehen. Diese ist auf Bundestagsdrucksache 19/12777 auf der Internetseite des Deutschen Bundestages abrufbar.

NATO STANDARD

AMedP-4.9

REQUIREMENTS FOR WATER POTABILITY DURING FIELD OPERATIONS AND IN EMERGENCY SITUATIONS

Edition A Version 1
MARCH 2013



NORTH ATLANTIC TREATY ORGANIZATION

ALLIED MEDICAL PUBLICATION

Published by the
NATO STANDARDIZATION AGENCY (NSA)

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION AGENCY (NSA)

NATO LETTER OF PROMULGATION

21 March 2014

1. The enclosed Allied Medical Publication AMedP-4.9, Edition A, Version 1, REQUIREMENTS FOR WATER POTABILITY DURING FIELD OPERATIONS AND IN EMERGENCY SITUATIONS, which has been approved by the nations in the Military Committee Medical Standardization Board, is a non-classified publication and is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 2136

2. AMedP-4.9, Edition A, Version 1, is effective upon receipt.

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4. This publication shall be handled in accordance with C-M(2002)60.

Dr. Cihangir Aksit, TUR Civ
Director NATO Standardization Agency

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
General	EST, HRV
1	
2	FRA
Annex A	NLD, SVK
Annex B	CZE, FRA, SVK
Annex C	FRA
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
CZE	At present CZE cannot fulfil the requirement for testing the full scale of chemical parameters of potable water in the field as stated in AMedP-4.9(A), Annex B.
EST	There are no capabilities for water quality testing in the field in the Estonian Defence Forces at the present time. If necessary, water potability testing is provided by authorized national civilian institutions or coalition partners
FRA	France will not implement the following parts of AMedP-4.9(A). a) In Annex B – Standards for water potability and testing frequency for routine situations If the Long Term Standards (LTS) are exceeded, and no Short Term Standards (STS) have been established, an analysis of the hazards is conducted in France to determine the required corrective actions. b) Annex B, page B-3 – Radioactivity As far as alpha and beta activities are concerned, if the Long Term Standards (LTS) are exceeded, a risk assessment is conducted in France based on the calculation of the total indicative dose. c) Procedure for the validation of exceedances of the optimal expiration date proposed in paragraph 2.4 – Bottled and packaged water, pages 2.7 and 2.8 As far as France is concerned, when the optimal expiration date of a lot of bottled water has expired, this water can still be consumed if no particular risk for the consumer has been identified through an assessment of the hazards. d) Annex C – Minimum frequencies for water testing for routine situations France will not implement Annex C for the following reasons. In general, as far as the tests A, B and C described in Annex B are concerned, type A and B analyses are conducted on water immediately after treatment, while type C tests are carried out at points of consumption. Regarding packaged water, it is questionable to determine a testing frequency in the absence of a sampling plan (number of bottles to be sampled within a lot), as well as test parameters, without relating them to technology and context (supplier's observed level of mastery). France determines on a case-by-case basis the required

	sampling plans and testing patterns. Regarding commercially bottled water used for force supply, an initial assessment of the production plant by a competent military authority, with the collection of sample, is required. Supplies are controlled by the military authority, which includes regular audits of the supplier's HACCP system and sample analysis. HACCP: *Hazard Analysis Critical Control Point* – Analyse des dangers et points critiques pour leur maîtrise.
HRV	The Medical support system in the Croatian Armed Forces shall meet the specified minimum requirements for field tests in operations. Other skills shall not be developed in the Armed Forces, but will rely on the authorized institutions in the Republic of Croatia and the Allied capabilities of the host nation in the area of operations.
NLD	NLD has no field capabilities to analyze inorganic mercuric compounds, total organic halogen, lewisite, sulfur, mustard, nerve agents, T-2 toxins, alpha, beta and gamma radiation (listed in Annex A).
SVK	The Slovak Armed Forces shall apply - in addition to the limits specified in Annex A and Annex B - also hydro-biological requirements for water intended for human consumption to the limits on living organisms and abioseston in accordance with the Council Directive 98/83/EC of 3rd November 1998 on the quality of water intended for human consumption. The extent of applicable components (parameters) of tests and specific chemical parameters analyzed according to the Annex A and Annex b is ordered by the competent authority in the field of public health, preventive medicine and/or food safety by assessing the current situation and local condition.

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TABLE OF CONTENTS

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CHAPTER 1 INTRODUCTION

1.1. GENERAL

This publication establishes the requirements for water potability during all field operations and in emergency situations. It remains a national responsibility to use qualitatively higher requirements. The document is primarily meant to be used by water specialists.
Water is required for numerous activities during field operations. The most important of these is drinking by individuals. Drinking water must be readily available and consumed in adequate quantities to prevent dehydration. It must be potable or otherwise it may have adverse health effects on the consumers. It must also be palatable so personnel will be willing to drink it in adequate quantities.

1.2. AIM

The purpose of the AMedP-4.9 is to:

- establish a standardised approach to ensure the quality of drinking water provided to the troops during all field operations (exercise, Article 5 or non-Article 5),
- establish the minimum requirements for potability of drinking water provided to troops in a theatre of operations during emergency situations,
- establish the minimum water quality testing capabilities required in the field.

1.3. DEFINITIONS

The following definitions apply:

Approved source for bottled water
An approved source for bottled water is a production plant that has been approved by the competent national military authority based on:
- a performed audit (e.g. Worldwide Directory of Sanitarily Approved Food Establishments for Armed Forces Procurement),
- existing accepted certificates (ISO 22000, BRC, IFS, NSF) or
- information received by a partner nation based on STANAG 2541.

Approved source for packaged water
An approved source for packaged water is a production plant that has been approved by the competent national military authority based on the following criteria:
- an initially performed audit with extended sampling,
- a production and distribution according to the HACCP principles,
- an existing monitoring plan of the source performed or controlled by a competent military authority assuring that the quality of the produced water is in compliance with the Long Term Standards of ANNEX B of this AMedP.

Black water
Black water is wastewater containing faecal matter and/or urine.

Bottled water
Bottled water is potable water that is sealed in plastic or glass bottles by commercial businesses and produced for human consumption.

Bulk water
Bulk water does not refer to a type of water but to the larger volume. Bulk water is transported/distributed by trucks, trailers, flexible tanks or containers.

Contaminated water
Water which contains disease-producing organisms, poisonous substances or NBC agents and therefore unfit for human consumption.

Domestic water (see **technical water**)

Drinking water
Drinking water is potable water. Drinking water must also be palatable so personnel will be willing to drink it in adequate quantities.

Emergency potable water
Water that is from a medical point of view safe to drink with respect to performance degradation during a maximum period of 7 days.

Grey water
Water that is the leftover from baths, showers, kitchens and washing machines.

Hygienic water (see **sanitary water)**

Non-potable water
Water that is not safe to drink. In the operational environment it is water from any source that has not been approved by the local medical authority for use as drinking water.

Packaged Field water
Packaged field water is water that is treated in order to make it potable and sealed in plastic pouches or bottles by military units or contracted services for ultimate distribution to individual personnel for drinking

Palatable water
Palatable water is cool, aerated, significantly free from colour, turbidity, taste, and odour, and is generally pleasing to the senses. Palatable water is not necessarily potable and may contain disease- or illness-causing substances.

Polluted water
Water that contains substances such as garbage, sewage, industrial/agriculture waste or mud which makes it objectionable because of appearance, taste or odour.

Potable water
Potable water is water that is fit for human consumption and therefore safe to drink. This water is, from medical point of view, suitable for drinking, the preparation of food and all the domestic uses, including personal hygiene. It does not contain chemical, microbiological, radiological or other contaminants in concentrations that may result in adverse health effects.

Raw water
Raw water is fresh, brackish or sea water that has not been previously used, treated, or purified. Raw water must be treated and/or disinfected prior to use as potable or sanitary water.

Sanitary water
Sanitary water is water to be used for personal hygiene.

Technical water
Water that is required for a variety of purposes such as fire fighting, decontamination, cooling of vehicles and machinery, as well as construction work.

Water disinfections
Disinfection is a water treatment process in which pathogenic (disease producing) organisms are killed, destroyed or otherwise inactivated. Common methods of disinfecting drinking water include boiling, ultraviolet (UV) radiation, and various procedures using chlorine, chlorine dioxide, iodine, or ozone.

Water purification
Water purification is the process to remove suspended solids, undesirable chemicals and (micro)biological contaminants.

Water treatment
Water treatment is the process used to make the water acceptable for its intended use.

1.3. AGREEMENT

Participating nations agree:

1. that the provision of safe drinking water in the field is an operational necessity,

2. that all health related risks will be assessed in setting criteria for the quality of drinking water during operations,

3. that the minimum criteria for the quality of drinking water based on

performance related risks will only be applied in emergency situations,

4. to follow the procedures of risk management described within this document,

5. to notify other armed forces participating in mutual logistical water support, when unable to meet the requirements prescribed.

1.4. REQUIREMENTS

Chapter 2 describes:

1. the procedures of risk-assessment for the supply of bulk, bottled and packaged potable water during operation,

2. the most probable variations in water supply,

3. the risks in the supply chain from the raw water source to the point of use and their countermeasures,

4. the essential process-controls and the diagnostic/quality tests needed to identify the countermeasures,

5. the minimal water quality testing capabilities to be deployed in the field by nations in order to guarantee a minimal assurance,

6. the minimal standards for water quality differentiated for routine and for emergency situations.

CHAPTER 2 RISK MANAGEMENT

2.1. GENERAL

1. The risk management process of identifying, assessing and controlling hazards is to be used to maintain potable water in order to conserve performance and health.

2. The risk management is based on STANAG 2535 (AMedP-21) – Deployment Health Surveillance (edition 1, 2010).
In risk management five steps can be identified:

a. Identify the hazard

b. assess the hazard to determine the level of risk

c. develop controls and make risk decisions

d. implement controls

e. supervise and evaluate

3. The flowchart in figure 1 gives a schematic overview of the water supply. Based on this chart, the major risks (known as Critical Control Points) and their countermeasures (type of treatment, process controls, quality monitoring) are identified. The chart may be used to assist in evaluating the following aspects, which are to be considered in managing the risk associated with water supplies:

a. The operational situation.
Water quality standards are provided for two operational situations: routine and emergency.

b. Quality of the raw water.
The quality of the raw water determines the purification demands needed to assure the quality standards. The quality of the raw water is specified in the flow chart in terms of the level of purification technology.

c. Purification technology.
The two primary technologies employed by participating nations are shown and their critical process controls are specified. Other purification technologies (not specified) could also be used to meet the quality standards of the purified water; other process controls could then be applicable.

d. Storage and distribution.

Causes of post-treatment deterioration in water quality during storage and distribution must be considered in conjunction with implemented and possible countermeasures to identify and minimize such hazards. Examples include the maintenance and monitoring of chlorine residuals.

e. Field testing capabilities
For minimum control on site with respect to processes in the chain of supply and with respect to quality at the point of consumption minimum field testing capabilities are specified.

4. Commanders are, with respect to the quality of water, required to ensure that all hazards are identified, assessed, and migrated to the extent feasible using operational risk management and decision-making tools. Medical personnel must advise and provide recommendations to commanders to help them evaluate the risks associated with the water support mission and make the best risk management decisions. Medical personnel provide this support at all levels of command and through all phases of the operational cycle. Combining the probability of decreased water quality and the severity of the related health effects will give an indication of the health risk.
Reduction of the severity of the risk may be achieved by additional treatment (for example filtration, chlorination) or getting water from another water supply point or limiting the use of water.
A potential threat to the quality of the water supply can also be mitigated by increasing the frequency of monitoring the critical process controls and the quality on the distribution side.

2.2. QUALITY STANDARDS FOR DRINKING WATER DURING OPERATIONS

1. The goal is to provide drinking water to deployed personnel that from a health perspective is comparable to homeland civil standards. As a result of the operational situation lower, guarantees on the quality of the water supply may have to be taken into consideration.

2. In the provision of (bulk) drinking water two situations are identified:

a. Emergency Situation.
The definition of an emergency situation with regard to water supply, is a situation, when due to hostile activity or other **severe, unforeseeable** conditions, water that meets the routine situation quality criteria cannot be produced or re-supplied. During an emergency situation the quality of the water supply should at a minimum meet standards designed to prevent unacceptable performance degradation. Even in situations when safe drinking water (i.e. compliant with the strict civilian standards) cannot be produced on site and the routine supply lines have been interrupted, any logistical means available should be used to provide safe drinking water to deployed NATO troops in the operational environment. The acceptable period to use water that meets the emergency situation criteria is up to 7 days. The Minimum Standards for Emergency Situation (MSES) are listed in Annex A.

b. Routine Situation.
In all situations when the definition of an emergency situation is not applicable a routine situation exists. In the routine situation, a quality assurance system based on the HACCP principles for the whole water supply chain from source to tap is operational. For the routine situation the quality of the water should be in compliance with health based homeland civil standards. These standards are listed as Long Term Standards (LTS) in Annex B and can be used for long-term consumption and will prevent adverse health effects. For the timeframe between water sampling and definitive analyses of all the Annex B constituents/characteristics a temporary decision for the release of the water based on field quality analyses is an operational necessity. Therefore Short Term Standards (STS) are included in Annex B. STS can be applied for a limited period of 30 days and reflect the upper limit for unacceptable performance degradation.

3. The standards for drinking water are based on a consumption level up to 5 litres per day. Higher consumption rates require additional risk assessment. The standards are further based on the duration of the consumption (during a military operation) and the health of the military population. The standards should be used by water quality experts to advise the Commander on the possible effects of the water quality on performance degradation and the short-term/long-term health effects on personnel consuming the water.

a. Minimum standards for emergency situation (MSES) (Annex A).
The MSES (Annex A) are based on a military acceptable degree of performance degradation of military personnel. The health effects that may reduce individual performance within the 7 days of consumption are detailed in the Potential Health Effects column. For some of the parameters the allowable levels are based on direct toxic effects. For others the standards present points where the water becomes unpalatable and risk of dehydration arises.
The microbiological standard is an indicator for pathogenic contamination of the water. At the levels of the standards individuals (<10%) might be affected, but overall unit performance (mission accomplishment) should not be jeopardised. Consuming water that does not meet one or more of the standards should be considered a significant operational risk. The standards are based on “Evaluation of Military Field-Water Quality” (Daniels, 1990).

b. Standards for routine situations (Annex B).
For the routine situations two different sets of standards are identified:
Long Term Standards (LTS)
Long Term Standards are health based standards. These LTS are in principle copied from the Guidelines for Drinking-water Quality (4th edition) of the WHO.
When a standard is based on another reference this will be annotated in Annex B. The selection of the constituents/characteristics is based on Annex I (part A and B) of the European Directive 98/83/EC (November 1998).
Additional constituents/characteristics are added which are mainly related to the palatability of the water. These additions are annotated in Annex B.

In the European Directive 98/83/EC the pesticides are included as one group of compounds. One general standard for all pesticides is given in the Directive. In Annex B the following method of reasoning is used for the inclusion of specific pesticides:

- Pesticides for which guidelines are specified in the WHO Guidelines for Drinking-water Quality, 4th edition are included. These pesticide specific guidelines are copied into the Annex B.
- Pesticides for which Health Canada and US Environmental Protecting Agency both have health based standards (respectively a maximum acceptable concentration (MAC) and maximum contaminant level (MCL)) which are not already listed in WHO guidelines. The most conservative standards for the pesticide is included to the Annex B)

  Water in compliance with the LTS can be consumed for long-term period without any reverse health effect.

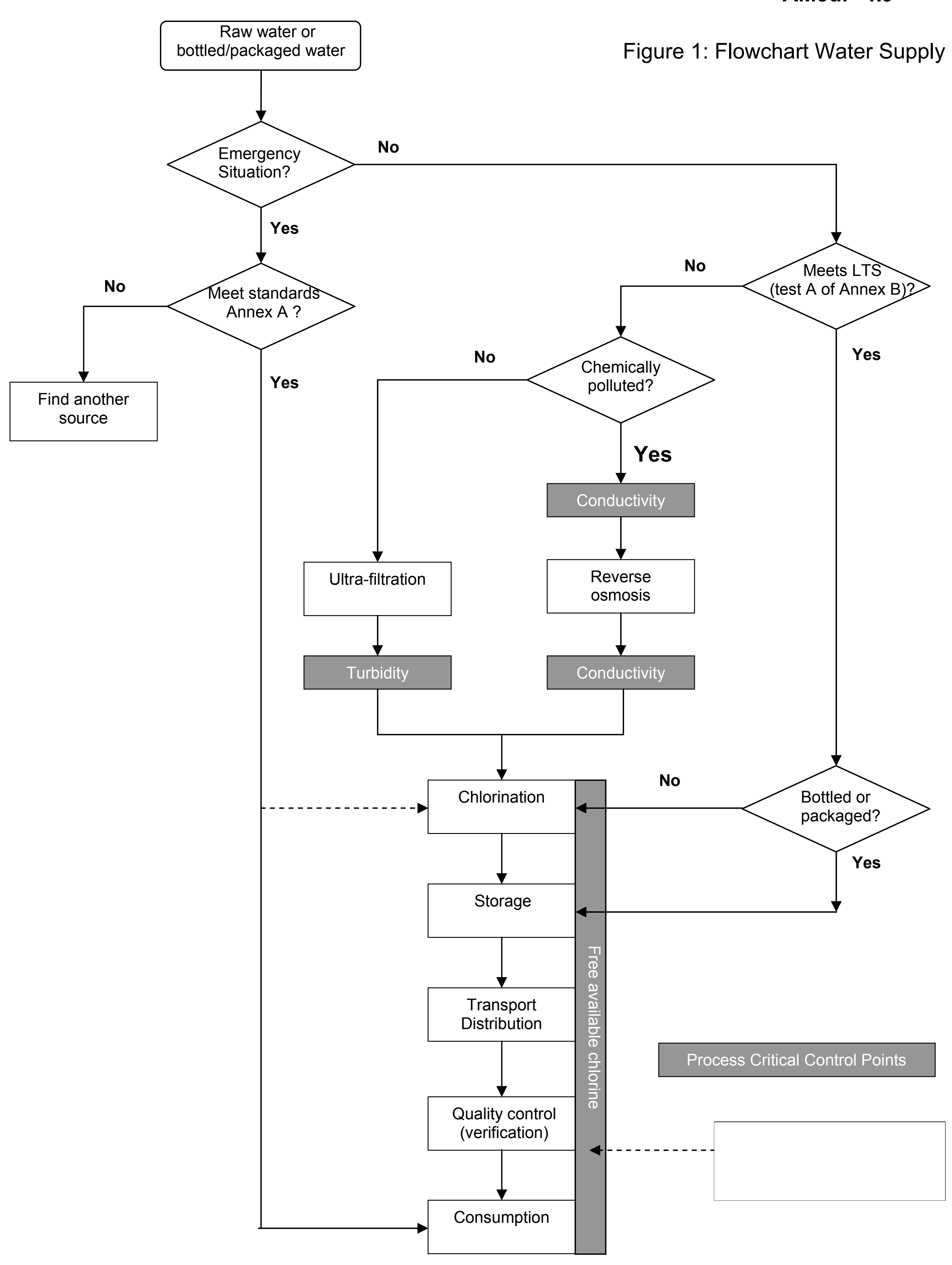
Short Term Standards (STS)

A complete analyses of all Annex B parameters/characteristics (by homeland laboratories) and additional risk evaluation (by homeland water experts) will need in general a maximum period of 30 days. Due to this limitation during a routine situation there is an operational need to evaluate the water quality for the first 30 days of use.

For this evaluation Short Term Standards are included in Annex B. The STS are scientifically based (‘Evaluation of Military Field-Water Quality’, (Daniels, 1990)) levels at which some sensitive individuals might experience adverse short-term health reactions, but overall unit performance and mission accomplishment should not be jeopardized. STS are based on direct toxic effects or represent points where the water may become so unpalatable that personnel will choose to become dehydrated rather than drink it. STS can be evaluated with simple field equipment.

If water does not meet the LTS but is in compliance with the STS, immediate corrective action is needed to prevent further quality loss.

Figure 1: Flowchart Water Supply



2.3. QUALITY OF THE RAW WATER SOURCE

1. Deployed forces should make maximum use of local water supply systems. Where the standard or capacity of local systems is inadequate and cannot be quickly improved, alternative sources such as surface or groundwater will have to be sought. Whatever the source, it must be the best available, based upon the appropriate assessment. The initial quality assessment and deviations will quantify the risk of the source for future water development.

2. To assess the potability of the raw water the parameters of Annex B (test A) shall be evaluated. Based on the results of this examination, the necessity for additional purification will be determined. For chemical polluted water reverse osmosis will be used. For microbiologically polluted water, ultra-filtration or reverse osmosis will be used: In addition to the microbiological constituents of Annex B, the turbidity should be taken into consideration. Other purification technologies (not specified) can also be used to meet the quality standards of the purified water; other process controls should then be applied.

3. n the absence of results from the parameters of Annex B tests, the raw water must be assumed to be contaminated and only purification by reverse osmosis will maximize the assurance on the production of an acceptable quality.

4. For the routine situation the quality of the supply has to be verified periodically. This verification is done on the distribution side. The standards of Annex B are categorised into three different tests: A, B and C. In Annex C the frequencies for test A, B and C are detailed. The quality of the raw water will determine the purification needed and the testing frequency, as detailed in Annex C. The examination of the water quality should be done on basis of a risk assessment that argues why constituent/characteristic are excluded from the analysis plan given in Annex B and C All test results (obtained both by field and by homeland laboratories) and operational incidents with water quality aspects must be recorded and kept available for a minimum period of two years. Test results (and the underlying risk assessment) should be available in the theatre of supply.
Verification should be done by a laboratory which preferably works according to the principles of GLP (Good Laboratory Practice) or otherwise produces equivalent reliable good results

5. In an emergency situation, the raw water source may need to be used for direct consumption. Although some purification can improve the quality, no quality assurance according to civil standards will have been carried out. Besides the option to use other raw water with a better quality, no other countermeasures, such as purification, are possible. At Annex A the minimum standards for water potability for short term (emergency) consumption during all field operations are detailed. The capability to examine the water quality during an emergency situation should be based on the standards of Annex A. Some standards of Annex A are marked because there are no simple techniques currently available to measure the constituents at the relevant limits.

2.4. BOTTLED AND PACKAGED WATER

Commercially bottled water (CBW) and packaged field water (PFW) may be used for drinking instead of bulk-produced water during the initial phase of deployments prior to establishing bulk water production sites or for any period of time determined by the Task Force or other commander. These products are generally considered food products and are handled, stored, and inspected by Quartermaster personnel augmented by Veterinary and Preventive Medicine personnel in a manner similar to other purchased packaged food products.

1. CBW should only be procured from an approved source (defined in paragraph 1.3). CBW is purchased, transported, stored, and distributed under the direction of the quartermaster or other logistics (food-provisioning) organization. It is the responsibility of that organization to ensure that the CBW is procured from an approved source and transported, stored, and distributed safely, protected from accidental and intentional contamination, and in such a way that the quality of the water is not degraded from the time it is purchased until it is in the hands of deployed personnel. This includes providing appropriate physical protection from hostiles and the environment and managing CBW storage so its shelf life is not exceeded prior to distribution. Preventive medicine or veterinary personnel should ensure that CBW distributed during NATO operations comes from approved sources. They should also periodically coordinate with the operators of storage facilities to ensure good management practices are employed. During prolonged deployments, samples of each brand of CBW should be collected semi-annually and tested onsite or submitted to a laboratory for testing for the Test A parameters listed in ANNEX B. Preventive medicine or veterinary personnel should be prepared and able to evaluate CBW onsite for the Test B parameters in the event a unit or CBW storage facility operator suspects contamination or requests that the shelf life of a particular lot or brand of CBW be extended. Preventive medicine and veterinary personnel may extend the shelf life of CBW up to 30 days after physical inspection and testing for Test B parameters confirms that the water is in compliance with the LTS.

2. PFW packaging equipment and product must be evaluated and approved by Preventive Medicine and Veterinary Personnel before it is used to produce PFW for drinking in the field. The approval mechanism should ensure that the packaging containers, equipment, personnel, and procedures do not adulterate the potable water that is packaged. Approved sanitary set up and operation of the equipment should be documented in a standing operating procedure (SOP) that is followed and maintained at the PFW production location. A successful health risk assessment should be part of the approval mechanism, and should result in a Negligible or Low health risk from drinking the water produced by the PFW operation for the period of intended operation. A shelf life should be assigned to the PFW that is agreed upon by the PFW system owner/operator and appropriate Preventive Medicine and/or Veterinary personnel. The date of production and/or the shelf life expiration date as well as the equipment that produced each package must be printed or embossed on each container. The purity of PFW product water should be monitored for select Test B parameters (to be determined by Preventive Medicine and/or Veterinary personnel) immediately or shortly after production, to ensure product potability prior to distribution to units or individuals. If PFW is distributed in bulk lots and placed in storage facilities, the stored product should be handled and managed in the same

manner as CBW to ensure its continued potability from the time it leaves the production point until it is in the hands of the consumers. Samples of influent water and from PFW containers from systems operated for extended periods of time should be collected semi-annually and tested onsite or submitted to a laboratory for testing for the Test A parameters listed in ANNEX B. As with CBW, PFW shelf life may be extended in 30-day increments by Preventive Medicine and/or Veterinary personnel after physical inspection and testing for Test B parameters confirm that the water remains potable.

2.5. PURIFICATION

The flowchart defines two different purification steps for routine situations:

2.5.1. REVERSE OSMOSIS (RO)

The RO unit is the most effective method of field water purification. The RO unit contains a membrane filter that removes particles with a diameter of 10^{-9} m and larger, metal ions and aqueous salts. A lower water quality than expected can be caused by soluble constituents passing through the membranes. To control this risk, conductivity is to be measured before raw water enters the RO unit and after filtration. Systems that are comparable to RO with respect to the purification characteristics can be considered as equivalent in the water supply.

2.5.2. ULTRAFILTRATION (UF)

Ultrafiltration is designed to eliminate the microbiological and parasitological contamination of the raw water. Ultrafiltration uses membranes with a pore size between 10^{-7} and 10^{-8}m. For the removal of viruses the absolute pore size has to be 10^{-7}m. Direct (real time) control and measurement of this process, on the microbiological elimination, is not feasible. Therefore this process is monitored (indirectly) by examining the turbidity of the processed water and recording irregular and/or unexpected changes and by verifying the actual turbidity with the maximum value (< 1 NTU). Unexpected changes in the turbidity are indicative of integrity decrease of the membranes. Water with a turbidity above the maximum value has to be qualified as microbiologically unsafe. Systems that are comparable to ultrafiltration with respect to the purification characteristics can be considered as equivalent in the water supply.

2.6. CHLORINATION[1]

1. Chlorination can be accomplished using compounds as calciumhypochlorite (granular) and sodiumhypochlorite (liquid bleach). Chlorination is done for three reasons:

   a. to prevent eventual regrowth of opportunistic (pathogenic) bacteria during storage, transport and distribution,
   b. to form a second barrier against microbiological, accidental or intentional, contamination,
   c. to provide a residual as an indicator; the presence of free available chlorine indicates the lack of post-treatment contamination.

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[1] Chlorination can be part of the supply during an emergency situation

2. The concentration of free available chlorine residual at the point of consumption in routine situations should be ≥ 0.1 and preferably ≤ 0.3 mg/L. Operational situations can result in higher concentrations but should remain ≤ 5.0 mg/L.

3. Chlorination can also be used for disinfecting water and field water equipment. For the disinfection higher (> 5 mg/L) levels of available chlorine are used to accomplish an effective contact-time assuring the intended reduction of microbiological organism.

2.7. STORAGE, TRANSPORT AND DISTRIBUTION

1. A decrease in the quality of water during these processes can be caused by internal and external factors. Contamination and regrowth are the two major risks.

2. Contamination can occur:

a. when treatment system fails;
b. when contaminated water surrounding the distribution system enters because of low internal pipe pressure or through the effect of "pressure wave" within the system;
c. when contaminated water is drawn into the distribution/storage system through back flow resulting from reduction of line pressure and a physical link between contaminated water and the distribution/storage system;
d. through human error (illegal or unauthorised connections) resulting in unintentional cross-connection of waste/stormwater pipes into the distribution system;
e. through intentional contamination by enemy/terrorist action;
f. through open or unsecured storage of treated water, including, for bottled and packaged water, warehouses, field storage locations, and the bottles and packages themselves;
g. when existing mains are repaired or when new mains are installed by the introduction of contamination (soil, debris) into the system;
h. through leaching of chemicals and metals from bottles and packaging materials, pipes, solders, jointing compounds, taps and chemicals used in cleaning and disinfection;
i. through diffusion through synthetic pipes, bottles and packaging materials, of chemicals like petrol, oil and war-agents;
j. if no or improper cleaning and disinfection procedures have been applied to storage tanks and water trucks.

3. The countermeasures for contamination are technological and security based:

a. maintaining adequate routine monitoring for indicators of possible contamination;
b. maintaining adequate system pressure;
c. having back-up system for power supply;
d. installing prevention devices for cross-connection and back-flow;
e. fully securing storage and distribution systems;
f. implementing timely and effective repair procedures;
g. cleaning and disinfection procedures;
h. establishing security precautions for sabotage

i. performing enhanced and more frequent surveillance and monitoring.

4. Cleaning and disinfection procedures:
   a. implement and apply adequate methods for cleaning and disinfecting containers, tubing, distribution system and connection pieces prior to use, and a least once a year;
   b. apply effective corrective actions of cleaning and disinfection of containers and distribution system after being used to carry water that had been declared non potable and when container, tubing or connection pieces have been contaminated;
   c. implement and apply methods for cleaning, disinfecting and storage of empty containers, tubing and connection pieces;
   d. keep record of all executed cleaning, disinfection and corrective actions.

5. Regrowth can be controlled by:
   a. aggressive cleaning and disinfection and inspections of all components of military water supply storage, transport, and distribution systems prior to putting into use;
   b. avoiding contamination and maintaining a free available chlorine residual in bulk and packaged water;
   c. examination of the concentration of free available chlorine in bulk and packaged water during storage and transport/distribution. This will give an indication of both the integrity of the supply chain after purification and the possible regrowth;
   d. maintaining the sterile environment and sterility of water packaging material;
   e. storing bottled and packaged water out of direct sunlight and preferable in a cool location.

6. Water purified by reverse osmosis (without remineralisation) can be aggressive. This can result in significant increase of metal ions from the internal lining of the pipelines, storage tanks and water trucks.

7. Test C (Annex B) represents the minimum testing for the diagnosis of eventual contamination during storage and distribution (see figure 2). The reference for the results of test C are the LTS of Annex B.

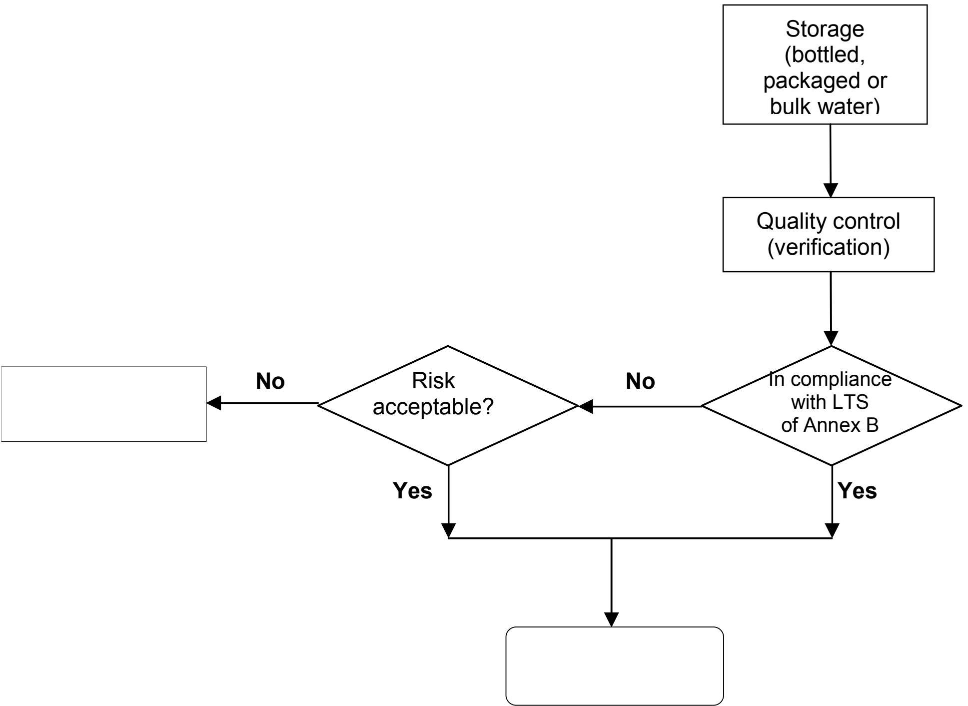


Figure 2: Flowchart Distribution

2.8. MINIMUM TESTING CAPABILITIES

For both routine and emergency situations field testing facilities should be available.
Field tests are performed:

- For the safety assessment of drinking water.
- As an indicator of water quality.
- To confirm that equipment and processes are being operated and conducted appropriately.

The constituents of Annex A that cannot be measured with simple techniques in the field are marked.
The minimum requirements for field tests are:
E.coli,
turbidity,
conductivity,
pH,
residual chlorine,
colour,
arsenic,
chloride,
cyanide,
magnesium,
sulphate.

2.9. WATER PROVIDED BY THIRD PARTIES/CONTRACTORS

The supply of water as a separated or as part of a combined service (e.g. a deployable camp) by the NATO Support Agency (NSPA) can be called in by a group of nations or by NATO. The group of nations and NATO (represented by the

Operational Command) will set the criteria and standards in a Statement of Work. NSPA is responsible that the contactor shall supply a quality of water that is in compliance with requirements specified in this AMedP.

For the supply of commercial bottled water only approved sources should be contracted (see paragraph 1.3). The quality of the water has to be verified according to paragraph 2.4.

The supply of bulk water by a contractor will have to be in compliance with all requirements specified for the routine situation. Contractors using non-military water treatment equipment must use chemicals and materials that have been tested and certified to the current NSF International standards 60 and 61; equipment using ultraviolet (UV) radiation must be certified to NSF standard 55. The civilian contractor operators of the water treatment/supply equipment should be trained and certified, if applicable, to operate the equipment. The quality of the water at the point of use must be in compliance with the LTS of Annex B. When the quality of the water does not meet the LTS involved nations have to be notified and corrective actions will have to be initiate to prevent further quality decrease.
The contractor will provide the involved nations a water supply plan (based on NEN-EN-ISO 9001) which describes at least the following aspects:

- Flow chart of the supply system
- The capacity of the supply system
- Quality of the raw water source
- Specification (certificates if applicable) of the purification system
- Specification of local test equipment,
- Task (operating procedures) and identity and qualifications (certificates if applicable) of operating personnel;
- Monitoring plan (constituents, sampling location, frequencies of testing, laboratory for testing, availability testing results)
- Procedures for corrective actions when quality is not in compliance

ANNEX A Minimum Standards Emergency Situation (MSES) for short term (≤ 7 days) water consumption[1]

E.coli[2]	No/100 ml	0	0	Mostly gasterointestinal effects due to presence of pathogenic micro-organisms, *E.coli* is indicative of the presence of pathogenic micro-organisms
colour	CU[3]	50	50	Risk of dehydration due to reduced water consumption caused by decreased palatability; symptoms of dehydration include weariness apathy, impaired co-ordination, delirium, heat stroke
turbidity	NTU[4]	1	1	- Risk of dehydration due to reduced water consumption caused by decreased palatability, - Mostly gasterointestinal effects due to presence of pathogenic micro-organisms, caused by decreased disinfection efficiency.
conductivity[5]	µS/cm	1500	1500	Risk of dehydration due to reduced water consumption caused by decreased palatability
pH	-	5-9.5	5-9.5	More corrosive activity on lower pH and decreased disinfection efficiency at higher pH
odour and taste	-	Acceptable	Acceptable	Risk of dehydration due to reduced water consumption caused by decreased palatability

1 Health related constituents and characteristics, other than those listed in the table, are to be maintained at levels which are as low as is reasonably practicable. This will require sufficient effort, depending on the circumstances, to ensure that health related risks will not be expected.
2 Before testing for *E.coli*, sodium thiosulfate shall be added to the sample to remove chlorine.
3 CU = Colour Unit; one Colour Unit = 1 mg platinum per liter water (cobalt-platinum method).
4 NTU = Nephelometric Turbidity Unit
5 The measurement of the conductivity is an indicator for the total dissolved solids. The standard for total dissolved solids is 1000 mg/l (independent the consumption level and period of consumption. The conversion-factor depends on the nature of the water and varies for natural waters from 0.55 to 0.70 (mg*cm) /(l*µS). The most conservative factor (0.7) is used for the conversion.

arsenic (As- fraction)	mg/L	0.3	0.1	Facial swelling, vomiting, loss of appetite, abdominal pain, diarrhoea, shock, muscle cramps, headache, chill, cardiac abnormalities, anaemia, decreased white blood cell count, enlargement of liver, delayed effects including sensory and motor peripheral polyneuropathies
chloride	mg/L	600	600	Risk of dehydration due to reduced water consumption caused by decreased palatability
cyanide	mg/L	6	2	Headache, breathlessness, weakness, palpitatian, nausea, vomiting, giddiness, tremor, rapid heartbeat, dizziness, confusion, anxiety, agitation, cardiac arrhythmias, seizures, stupor, coma
magnesium	mg/L	100	30	Laxative effect that can lead to symptoms of dehydration including weariness apathy, impaired co-ordination, delirium, heat stroke
inorganic mercuric compounds (Hg-fraction)[1]	mg/L	0.003	0.001	Mercury compounds mainly have health effects on the kidney and the central nervous system
sulphate	mg/L	300	100	Laxative effect that can lead to symptoms of dehydration including weariness apathy, impaired co-ordination, delirium, heat stroke
total organic halogen (Lindane as reference) [1, 2]	mg/L	0.450	0.150	Variable depending on the specific halogenated hydrocarbon(s)
lewisite (arsenic fraction) [1]	mg/L	0.080	0.027	Nausea, vomiting, diarrhoea, abdominal pain, intense thirst, weakness, hypotension, hypothermia

[1] At the moment these constituents cannot be measured (with simple techniques in the field).
[2] Total organic halogen (TOX) is measured as chloride: adsorption of the TOX on granular activated carbon and combustion of the carbon to form hydrogen halide, which is measured by microcoulometry. The toxicity for the wide range of halogenated hydrocarbons differs extremely. The TOX standard is based on the insecticide lindane; the emergency standards for lindane are for 0.6 mg/l at 5 l/day and 0.2 mg/l at 15 l/day.

sulphur mustard[1]	mg/L	0.140	0.047	Nausea, vomiting of blood, diarrhoea, abdominal pain, fever, headache, cardiac arrhythmias, dizziness, malaise, loss of appetite, lethargy, convulsion, leukopenia, anemia, immumosuppression
nerve agents[1]	mg/L	0.012	0.004	Nausea, vomiting, diarrhea, abdominal cramps, headache, giddiness, dizziness, excessive salivation, tearing, miosis, blurred or dim vision, difficult breathing, cardiac arrhythmias, loss of muscle coordination, muscle twitching, random jerking movements, convulsions, coma
T-2 toxins[1]	mg/L	0.026	0.0087	Nausea, vomiting, diarrhea, generalised, burning erythema, mental confusion
alpha	Bq/L	28500	9500	Nausea, vomiting, diarrhea
beta	Bq/L	255000	85000	The standard of each type of radiation correspondents with an exposure of 250 mSv.[2]
gamma	Bq/L	300000	100000	

[1] At the moment these constituents cannot be measured (with simple techniques in the field).

[2] Even under emergency situations, every effort should be made to keep the dose “as low as reasonably achievable (ALARA)”. In STANAG 2473 Edition 2 (Commanders guide to radiation exposure in non-article 5 crisis response operations) the following limits are specified for emergency situations:

- For priority tasks, i.e. tasks that contain the hazard, avert danger to persons or allow the mission to continue without major revisions in the operational plan, exposures of up to 100 mSv should not be exceeded.
- For critical tasks, i.e. tasks that save lives or allow continued support that is deemed essential by the Operational Commander to conduct the mission, 250 mSv are considered permissible.

The radiological standards at the exposure of 100 mSv can be derived by multiplication the standards at 250 mSv with a factor 0.4.

continued on page A-4

(continued from page A3). According to STANAG 2473 some critical tasks may be continued above 250 mSv. Moreover, in case of radiation exposure between 250 and 750 mSv, some acute adverse health effects will develop, resulting in immediate performance degradation. At this level of exposure, STANAG 2461, AMedP-6(C) Nuclear, recommends expedited evacuation from the operational environment, i.e. personnel affected will not be able to continue their mission. The standards in the table do not take into account the possibility of external whole body irradiation. If external radiation has been confirmed by dosimetry or has to be expected, an adapted activity limit can be calculated using the following equation:

$$\text{Activity-Limit}_{[\mathrm{Bq/l}]} = \frac{\text{Dose-Limit}_{[\mathrm{Sv}]} - \text{External Dose}_{[\mathrm{Sv}]}}{\text{dose coefficient}_{[\mathrm{Sv/Bq}]} \cdot \text{expected consumption volume}}$$

The levels of the different types of radiation that corresponds with the exposure limit of 250mSv in the table are based on worst-case dose coefficients. The following radionuclides which are released in significant quantities following a nuclear explosion or a nuclear accident were used for the estimation of the standards:

Radiation type	**Nuclide**	**Dose coefficient (ICRP-72) [Sv/Bq]**
Alpha	Pu-239	2,5E-07
Beta	Sr-90	2,8E-08
Gamma	I-131	2,2E-08

NATO CLASSIFICATION

ANNEX B TO AMedP-4.9

ANNEX B Standards for water potability and testing frequency for routine situations

Constituents/characteristics		Unit	Standards (5 liters/day)		Test[1]			Remarks
			Long Term[2]	Short Term	A	B	C	
Microbiological								
Coliform bacteria		CFU/100 ml	0	0	X	X	X	
Enterococci		CFU/100 ml	0		X	X[3]		
Escherichia coli (E. coli)		CFU/100 ml	0	0	X	X		
Physical								
Colour		CU	15	15	X	X		4
Conductivity		µS/cm	1500	1500	X	X[3]	X[5]	4
Odour		-	Acceptable	Acceptable	X	X	X	4
pH		-	6.5 - 9	5 – 9.5	X	X	X	4, 6
Taste		-	Acceptable	Acceptable	X	X	X	4
Turbidity		NTU	1	1	X	X	X[7]	4
Chemical (inorganic)	**cas#**							
Antimony	7440-36-0	mg/L	0.005		X			
Arsenic	7440-38-2	mg/L	0.01	0.02	X			
Boron (elemental)	7440-42-8	mg/L	1		X			
Cadmium	7440-43-9	mg/L	0.005		X			
Chloride	16887-00-6	mg/L	250	600[8]	X			4
Chlorine (free)	7782-50-5	mg/L	≥ 0.1 and ≤ 0.3	detectable and ≤ 5	X	X	X	4
Chromium	18540-29-9	mg/L	0.05		X			
Copper	7440-50-8	mg/L	2[9]		X			
Cyanide	57-12-5	mg/L	0.05	2.0[10]	X			
Fluoride	7681-49-4	mg/L	1.5		X			
Lead	7439-92-1	mg/L	0.01		X			
Magnesium	7439-95-4	mg/L	100[11]	100	X			4
Mercury (elemental)	7439-97-6	mg/L	0.001		X			
Nickel (elemental)	7440-02-0	mg/L	0.02		X			

1 The frequencies for the tests A, B and C are specified in Annex C.
2 For consumption rates > 5L/day additional risk assessment is required for all chemicals except chloride.
3 The monthly test on enteroccoci and conductivity is not necessary for bottled water
4 Constituent/characteristic is not listed in Annex I (part A and B) of the European Directive 98/83/EC (November 1998).
5 For the process control of the reverse osmosis the conductivity has to be determined real time (continuously or daily)
6 pH found in water has no direct health effects; pH is however one of the most important quality parameters for water. pH has a significant influence on disinfection capabilities by chlorine and should be below pH 8. A pH below 7 will result in corrosion of tanks and pipes and can result in the contamination of drinking-water and in adverse effects on its taste and appearance.
7 For the process control of the ultra-filtration the turbidity has to be determined real time (continuously or daily)
8 Standard based on "Evaluation of Military Field-Water Quality" (Daniels, 1990): can result in objective taste and risk of dehydration above this concentration.
9 Staining of laundry and sanitary ware may occur below guideline value.
10 Standard based on "Evaluation of Military Field-Water Quality" (Daniels, 1990): can result in headache, weakness, palpitation, nausea, giddiness, and tremors above this concentration.
11 Standard based on "Evaluation of Military Field-Water Quality" (Daniels, 1990): can result in laxative effect and risk of dehydration above this concentration.

Constituents/characteristics		Unit	Standards (5 liters/day)		Test[1]			Remarks
			Long Term[2]	Short Term	A	B	C	
Chemical (inorganic)	**cas#**							
Nitrate (as NO^{3-})	14797-55-8	mg/L	50		X			
Nitrite (as NO^{2-})	14797-65-0	mg/L	0.1		X			
Selenium	7782-49-2	mg/L	0.01		X			
Sulphate	14808-79-8	mg/L	250	300[3]	X			4
Uranium	7440-61-1	mg/L	0.03		X			4, 5
Chemical (organic)	**cas#**							
Benzene	71-43-2	mg/L	0.001		X			
Benzo[*a*]pyrene	50-32-8	mg/L	0.00001		X			
Bromodichloromethane	75-27-4	mg/L	0.06		X			
Bromoform	75-25-2	mg/L	0.1		X			
Chloroform	67-66-3	mg/L	0.3		X			
Dibromochloromethane	124-48-1	mg/L	0.1		X			
Dichloroethane, 1,2-	107-06-2	mg/L	0.03		X			
Epichlorohydrin	106-89-8	mg/L	0.0001		X			
Tetrachloroethene (PERC)	127-18-4	mg/L	0.04		X			
Trichloroethene	79-01-6	mg/L	0.02		X			
Chemical (pesticide)	**cas#**							
Alachlor	15972608	mg/L	0,002		X			
Aldicarb+metabolites	116063	mg/L	0,0047		X			
Aldrin+Dieldrin	309002+60571	mg/L	0,00003		X			
Atrazine+metabolites	1912249	mg/L	0,003		X			
Carbofuran	1563662	mg/L	0,007		X			
Chlordane (total)	57749	mg/L	0,0002		X			
Chlorotoluron	15545489	mg/L	0,03		X			
Chlorpyrifos	2921882	mg/L	0,014		X			
Cyanazine	21725462	mg/L	0,0006		X			
2,4-D	94757	mg/L	0,03		X			
2,4-DB	94826	mg/L	0,09		X			
DBCP	19961208	mg/L	0,001		X			
1,2-DCP	78875	mg/L	0,004		X			
DDT+metabolites	107917420	mg/L	0,001		X			
1,2-Dibromoethane	106934	mg/L	0,0004		X			
1,3-Dichloropropene	542756	mg/L	0,02		X			
Dimethoate	60515	mg/L	0,00093		X			
Dioxins and Furans (TEQ)	-	mg/L	0,000000015		X			
2,4-DP	120365	mg/L	0,1		X			
Endrin	72208	mg/L	0,0006		X			
Glyphosate	1071836	mg/L	0,28		X			

[1] The frequencies for the tests A, B and C are specified in Annex C.
[2] For consumption rates > 5L/day additional risk assessment is required for all chemicals except chloride.
[3] Standard based on "Evaluation of Military Field-Water Quality" (Daniels, 1990): can result in laxative effect and risk of dehydration above this concentration.
[4] Constituent/characteristic is not listed in Annex I (part A and B) of the European Directive 98/83/EC (November 1998).
[5] Only chemical aspects of uranium are addressed.

NATO CLASSIFICATION

ANNEX B TO AMedP-4.9

Constituents/characteristics		Unit	Standards (5 liters/day)		Test[1]			Remarks
			Long Term[2]	Short Term	A	B	C	
Chemical (pesticide)	**cas#**							
HCBD	87683	mg/L	0,0006		X			
Heptachlor	76448	mg/L	0,0004		X			
Heptachlor Epoxide	1024573	mg/L	0,0002		X			
Isoproturon	34123596	mg/L	0,009		X			
Lindane (total)	58899	mg/L	0,0002		X			
Malathion	121755	mg/L	0,093		X			
MCPA	94746	mg/L	0,002		X			
Mecoprop	93-65-2; 7085-19-0	mg/L	0,01		X			3
Methoxychlor	72435	mg/L	0,02		X			
Metolachlor	7440020	mg/L	0,01		X			
Molinate	2212671	mg/L	0,006		X			
PCBs (total)	1336363	mg/L	0,0005		X			
Pendimethalin	40487421	mg/L	0,02		X			
Pentachlorophenol	87865	mg/L	0,009		X			
Picloram	19180201	mg/L	0,19		X			
Simazine	122349	mg/L	0,002		X			
2,4,5-T	93765	mg/L	0,009		X			
TBA	5915413	mg/L	0,007		X			
2,4,5-TP	93721	mg/L	0,009		X			
Trifluralin	1582098	mg/L	0,02		X			
Radioactivity								
Total α activity		Bq/L	0.5	0.5	X			
Total β activity		Bq/L	1	1	X			

[1] The frequencies for the tests A, B and C are specified in Annex C.
[2] For consumption rates > 5L/day additional risk assessment is required for all chemicals except chloride.
[3] Racemic mixture

INTENTIONALLY BLANK

ANNEX C TO
AMedP-4.9

ANNEX C Minimum frequencies for water testing for routine situation

	Test[1]		
Purification	**A**	**B**	**C**
None (potable water)	2/year	1/month	1/week
Ultra-filtration	2/year	4/year	1/week
Reverse osmosis	1/year	4/year	1/week
Bottled/packaged water	1/year	1/month	-

[1] The constituents/characteristics corresponding to the tests A, B and C are specified in Annex B. The precise list of characteristics/constituents from Annex B that will have to be analysed, must be based on a risk assessment.

AMedP-4.9(A)(1)

STANDARDIZATION AGREEMENT

ACCORD DE NORMALISATION

STANAG 2136

REQUIREMENTS FOR WATER POTABILITY DURING FIELD OPERATIONS AND IN EMERGENCY SITUATIONS

EXIGENCES EN MATIÈRE DE POTABILITÉ DE L'EAU AU COURS D'OPÉRATIONS EN CAMPAGNE ET DANS DES SITUATIONS D'URGENCE

EDITION/ÉDITION 6
21 March/mars 2014
NSA(MED)0374(2014)MEDSTD/2136



NORTH ATLANTIC TREATY ORGANIZATION

ORGANISATION DU TRAITÉ DE L'ATLANTIQUE NORD

Published by
THE NATO STANDARDIZATION AGENCY (NSA)

Publié par
l'AGENCE OTAN DE NORMALISATION (AON)

21 March/mars 2014

STANAG 2136
Edition/Édition 6

LETTER OF PROMULGATION

STATEMENT

The enclosed NATO Standardization Agreement (STANAG), which has been ratified by member nations, as reflected in the NATO Standardization Document Database (NSDD), is promulgated herewith.

IMPLEMENTATION

This STANAG is effective upon receipt and ready to be used by the implementing nations and NATO bodies.

The partner nations are invited to adopt this STANAG.

SUPERSEDED DOCUMENTS

This STANAG supersedes the following document:

STANAG 2136, Edition/Édition 5, dated/du 22 October/octobre 2007

ACTIONS BY NATIONS

Nations are invited to examine their ratification of the STANAG and, if they have not already done so, advise the NSA of their intention regarding its implementation.

Nations are requested to provide to the NSA their actual STANAG implementation details.

SECURITY CLASSIFICATION

This STANAG is a NATO non classified document to be handled in accordance with C-M(2002)60.

LETTRE DE PROMULGATION

DÉCLARATION

L'accord de normalisation OTAN (STANAG) ci-joint, qui a été ratifié par les pays membres dans les conditions figurant dans la Base de données des documents de normalisation OTAN (NSDD), est promulgué par la présente.

MISE EN APPLICATION

Ce STANAG entre en vigueur dès réception et est prêt à être mis en application par les pays et les organismes OTAN d'exécution.

Les pays partenaires sont invités à adopter ce STANAG.

DOCUMENTS ANNULÉS ET REMPLACÉS

Ce STANAG annule et remplace le document suivant :

STANAG 2136, Edition/Édition 5, dated/du 22 October/octobre 2007

MESURES À PRENDRE PAR LES PAYS

Les pays sont invités à examiner l'état d'avancement de la ratification du STANAG et à informer, s'ils ne l'ont pas encore fait, l'AON de leur intention concernant sa mise en application.

Les pays sont priés de fournir à l'AON des informations détaillées sur la mise en application effective de ce STANAG.

CLASSIFICATION DE SÉCURITÉ

Ce STANAG est un document OTAN non classifié qui doit être traité conformément au C-M(2002)60.

for

Dr. Cihangir AKSIT, TUR Civ

Director, NATO Standardization Agency

M. Cihangir AKSIT, Ph. D.,TUR Civ.

Directeur de l'Agence OTAN de normalisation

STANAG 2136 Edition/Édition 6

REQUIREMENTS FOR WATER POTABILITY DURING FIELD OPERATIONS AND IN EMERGENCY SITUATIONS

AIM

The aim of this NATO standardization agreement (STANAG) is to respond to the following interoperability requirements.

INTEROPERABILITY REQUIREMENTS

Participating nations agree to follow the procedures for risk management described in AMedP-4.9. Participating nations agree to notify other armed forces participating in mutual logistical water support, when they are unable to meet the requirements prescribed in AMedP-4.9.

AGREEMENT

Participating nations agree to implement the following standard.

STANDARD

AMedP-4.9, Edition A

OTHER RELATED DOCUMENTS

STANAG 2541 - AUDIT PRINCIPLES AND RISK ASSESSMENT OF FOOD PROCESSORS AND SUPPLIERS PROVIDING FOOD TO THE MILITARY – AMedP-20

STANAG 2535 - DEPLOYMENT HEALTH SURVEILLANCE – AMedP-21

EXIGENCES EN MATIÈRE DE POTABILITÉ DE L'EAU AU COURS D'OPÉRATIONS EN CAMPAGNE ET DANS DES SITUATIONS D'URGENCE

BUT

Le présent accord de normalisation OTAN (STANAG) a pour but de répondre aux exigences d'interopérabilité suivantes.

EXIGENCES D'INTEROPÉRABILITÉ

Les pays participants conviennent d'appliquer les procédures de gestion des risques décrites dans l'AMedP-4.9. Ils conviennent également d'informer les autres forces armées participant au soutien logistique mutuel de l'approvisionnement en eau lorsqu'ils ne sont pas en mesure de satisfaire aux exigences prescrites dans cette publication.

ACCORD

Les pays participants conviennent de mettre en application la norme suivante.

NORME

AMedP-4.9, Édition A

AUTRES DOCUMENTS CONNEXES

STANAG 2541 - ÉVALUATION DES RISQUES ET PRINCIPES DE VÉRIFICATION DES FABRICANTS ET FOURNISSEURS DE PRODUITS ALIMENTAIRES POUR LE SECTEUR MILITAIRE - AMedP-20

STANAG 2535 - SURVEILLANCE SANITAIRE POUR LES DÉPLOIEMENTS – AMedP-21

NATIONAL DECISIONS

The national decisions regarding the ratification and implementation of this STANAG are provided to the NSA.

The national responses are recorded in the NATO Standardization Document Database (NSDD).

DÉCISIONS NATIONALES

Les décisions nationales concernant la ratification et la mise en application du présent STANAG sont communiquées à l'AON.

Les réponses nationales sont consignées dans la Base de données des documents de normalisation OTAN (NSDD).

IMPLEMENTATION OF THE AGREEMENT

This STANAG is implemented when a nation has issued the necessary orders or instructions to authorities and units concerned putting the requirements detailed in this agreement into effect.

After the STANAG has been implemented the nations have to work continually to enhance the STANAG and send the proposals to the custodian.

Nations are invited to report on their effective implementation of the STANAG using the form in Annex H to AAP-03(J).

Partner nations are invited to report on the adoption of the STANAG using the form in Annex G to AAP-03(J).

MISE EN APPLICATION DE L'ACCORD

Le présent STANAG est mis en application par un pays dès que celui-ci a transmis aux autorités et unités concernées les ordres ou instructions nécessaires à la mise en vigueur des exigences qu'il énonce.

Une fois le STANAG mis en application, les pays continueront à améliorer son contenu et enverront leurs propositions au pilote.

Les pays sont invités à rendre compte de la mise en application effective du présent accord au moyen du formulaire figurant à l'Annexe H à l'AAP-03(J).

Les pays partenaires sont invités à rendre compte de l'adoption du présent STANAG au moyen du formulaire figurant à l'Annexe G à l'AAP-03(J).

REVIEW

This STANAG is to be reviewed at least once every three years. The result of the review is recorded within the NSDD.

Nations and NATO bodies may propose changes, at any time, through a standardization proposal to the tasking authority (TA), where the changes will be processed during the review of the STANAG.

RÉEXAMEN

Le présent STANAG doit être réexaminé au moins une fois tous les trois ans. Le résultat de ce réexamen est consigné dans la NSDD.

Les pays et les organismes OTAN peuvent, à tout moment, proposer des modifications en soumettant une proposition de normalisation à l'autorité de tutelle (TA), qui traitera ces modifications lors du réexamen du STANAG.

TASKING AUTHORITY

This STANAG is supervised under the authority of:

AUTORITÉ DE TUTELLE

Le présent STANAG est sous la responsabilité de :

MILITARY COMMITTEE MEDICAL STANDARDIZATION BOARD/
BUREAU DE NORMALISATION MÉDICALE DU COMITÉ MILITAIRE
(MCMedSB)

Medical Standardization Working Group (MedStd WG)/
Groupe de travail Normalisation des services de santé militaires (GT MedStd)

CUSTODIAN

The custodian of this STANAG is:

PILOTE

Le pilote du présent STANAG est :

NLD/Pays-Bas
Food and Water Safety and Veterinary Support Expert Panel/
Groupe d’experts Sécurité de l’eau et des aliments et soutien vétérinaire

T.Sijbranda, Force Health Protection Expertise Centre (CEAG)
T.Sijbranda@mindef.nl

FEEDBACK

Any comments concerning this STANAG shall be directed to:

INFORMATIONS EN RETOUR

Tous les commentaires concernant le présent STANAG doivent être adressés à :

NATO Standardization Agency (NSA)

Agence OTAN de normalisation (AON)

Boulevard Léopold III
1110 BRUXELLES – Belgique

Satz: Satzweiss.com Print, Web, Software GmbH, Mainzer Straße 116, 66121 Saarbrücken, www.satzweiss.com
Druck: Printsystem GmbH, Schafwäsche 1-3, 71296 Heimsheim, www.printsystem.de
Vertrieb: Bundesanzeiger Verlag GmbH, Postfach 10 05 34, 50445 Köln, Telefon (02 21) 97 66 83 40, Fax (02 21) 97 66 83 44, www.betrifft-gesetze.de
ISSN 0722-8333